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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/558,542	04/26/2000	Sri Ram Gorti	105178	9596

7590 06/09/2004  
Oliff & Berridge PLC  
PO Box 19928  
Alexandria, VA 22320

EXAMINER

NAHAR, QAMRUN

ART UNIT	PAPER NUMBER
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2124

DATE MAILED: 06/09/2004

14

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/558,542

Applicant(s)

GORTI ET AL.

Examiner

Qamrun Nahar

Art Unit

2124

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3,5-13 and 15-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-13 and 15-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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### **DETAILED ACTION**

1. This action is in response to the amendment filed on 3/12/04.
2. The objections to claims 5 and 15 are withdrawn in view of applicant's amendments.
3. The rejection under 35 U.S.C. 103(a) as being unpatentable over Benson (U.S. 5,301,325) in view of Sato (U.S. 5,261,062) to claims 1-3, 5-13 and 15-20 is moot in view of the new ground(s) of rejection.
4. Claims 5 and 15 have been amended.
5. Claim 21 has been added.
6. Claims 1-3, 5-13 and 15-21 are pending.
7. Claim 21 is objected to because of informalities.
8. Claims 1-3, 5-13 and 15-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benson (U.S. 5,301,325) in view of Ravichandran (U.S. 6,035,120).

### ***Response to Amendment***

#### ***Claim Objections***

9. Claim 21 is objected to because of the following informalities: "a controller the divides" on line 7 of the claim should be "a controller that divides". Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-3, 5-13 and 15-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benson (U.S. 5,301,325) in view of Ravichandran (U.S. 6,035,120).

**Per Claim 1:**

Benson teaches a code translation device that translates a source code of a source processor into a target code of a target processor ("In accordance with one embodiment of the invention, a code translator is constructed in a manner similar to a compiler, and may indeed be implemented as part of a compiler. The code translator accepts as an input the assembly code or source code which is to be translated, in a manner similar to the front end of any compiler. The input code is parsed to determine its content, with the basic building blocks of the code identified (separated) and converted into an intermediate language. The intermediate language version of the code is stored in a data structure referred to as a flow graph. The flow graph is referenced by flow analyzer techniques and optimization routines, before generating object code for the target machine. This translator is particularly adapted for translating VAX assembly language into an advanced RISC architecture." in column 4, lines 3-18); a memory ("Fig. 2 is an electrical diagram of a host computer for executing the code translator program of Fig. 1" in column 7, lines 44-45 and Fig. 2, item 15, "MEMORY"); a controller, the controller dividing the source code into code blocks based on one or more instructions of the source code that either includes a branch, a loop return or an entry point for a branch or loop return ("The code translator accepts as an input the assembly code or source code which is to be translated, in a manner similar to the front end of any compiler. The input code is parsed to determine its content, with the basic

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building blocks of the code identified (separated) and converted into an intermediate language. The intermediate language version of the code is stored in a data structure referred to as a flow graph. The flow graph is referenced by flow analyzer techniques and optimization routines, before generating object code for the target machine. ... Another feature of interest in converting code from one architecture to another is that of register usage. ... In code generated by the compiler for register saves for an advanced 64-bit RISC architecture, only the low 32-bits of the 64-bit register can be put on the stack ... Accordingly, in one embodiment of the invention, the compiler tracks register usage to determine which registers are destroyed by a routine, and generate routine prologue and epilogue code which performs 64-bit register saves.” in column 4, lines 3-18 and lines 44-61; column 4, lines 67-68 to column 5, lines 1-18; and column 10, lines 20-30). Benson does not explicitly teach that the controller dividing the source code into code blocks based on a target processor register capability, wherein the controller identifies source register types as data registers or address registers of the source processor and corresponding target registers of the target processor that correspond to each of the source register types, the controller selecting one or more selected source register types and one or more maximum numbers of corresponding target registers that correspond to the selected source register types as the target register capability.

Ravichandran teaches that the controller dividing the source code into code blocks based on a target processor register capability, wherein the controller identifies source register types as data registers or address registers of the source processor and corresponding target registers of the target processor that correspond to each of the source register types, the controller selecting one or more selected source register types and one or more maximum numbers of corresponding

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target registers that correspond to the selected source register types as the target register capability (column 5, lines 46-67 to column 6, lines 1-25).

It would have been obvious to one having ordinary skill in the computer art at the time of the invention was made to modify the device disclosed by Benson to include that the controller dividing the source code into code blocks based on a target processor register capability, wherein the controller identifies source register types as data registers or address registers of the source processor and corresponding target registers of the target processor that correspond to each of the source register types, the controller selecting one or more selected source register types and one or more maximum numbers of corresponding target registers that correspond to the selected source register types as the target register capability using the teaching of Ravichandran. The modification would be obvious because one of ordinary skill in the art would be motivated to process instructions efficiently on the target processor by keeping track of register usage (Ravichandran, column 6, lines 43-57).

**Per Claim 2:**

The rejection of claim 1 is incorporated, and Benson further teaches a branch detector, the branch detector identifying one or more instructions of the source code that either includes a branch, a loop return or an entry point for a branch or loop return (column 4, lines 44-61 and column 10, lines 20-30).

**Per Claim 3:**

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The rejection of claim 2 is incorporated, and Benson further teaches wherein the controller generates one or more source code blocks based on the identified instructions, each of the source code blocks beginning immediately after an identified instruction and includes all consecutive instructions following the identified instruction up to an instruction immediately before a next identified instruction (column 10, lines 20-36 and lines 44-66).

**Per Claim 5 (Amended):**

The rejection of claim 3 is incorporated, and Ravichandran further teaches further comprising a register detector, the register detector detecting a number of source registers that are used and/or updated in one or more instructions of each of the source code blocks (column 6, lines 4-57).

**Per Claim 6:**

The rejection of claim 5 is incorporated, and Ravichandran further teaches wherein the controller generates one or more translated code blocks for each of the source code blocks based on a number of selected source registers detected by the register detector and the maximum numbers of corresponding target registers (column 6, lines 4-57).

**Per Claim 7:**

The rejection of claim 6 is incorporated, and Benson further teaches a stub generator, the stub generator generating a head stub and a tail stub for each of the translated code blocks (column 5, lines 14-18).

**Per Claim 8:**

The rejection of claim 7 is incorporated, and Benson further teaches wherein a head stub associated with a translated code block initializes one or more target registers used by the associated translated code block, the target registers being initialized by retrieving register values from a source register map that stores values of the source registers during execution of the translated code blocks (column 5, lines 18-43; column 6, lines 57-68 to column 7, lines 1-7; and column 7, lines 19-30).

**Per Claim 9:**

The rejection of claim 7 is incorporated, and Benson further teaches wherein a tail stub associated with a translated code block saves values of one or more target registers used by the associated translated code block in a source register map after execution of the translated code block (column 5, lines 18-40 and lines 45-47; column 6, lines 57-68 to column 7, lines 1-7; and column 7, lines 19-30).

**Per Claim 10:**

The rejection of claim 9 is incorporated, and Ravichandran further teaches wherein the source register map includes storage space for one or more values for each source register accounting for instruction execution delays, the tail stub saves values of the target registers in one or more appropriate locations in the source register map to account for the instruction execution delays (column 6, lines 4-57).



**Per Claim 11:**

This is a method version of the claimed device discussed above, claim 1, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above, including “identifying a target processor register capability” (Ravichandran, column 6, lines 4-25). Thus, accordingly, this claim is also obvious.

**Per Claims 12-13, 15 (Amended) & 16-20:**

These are method versions of the claimed device discussed above (claims 2-3 & 5-10, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

**Per Claim 21 (New):**

This is another version of the claimed device discussed above, claim 1, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above, including “a source processor having a finite number of data registers or address registers; a target processor having a finite number of data registers or address registers” (Ravichandran, column 6, lines 4-25). Thus, accordingly, this claim is also obvious.

***Response to Arguments***

12. Applicant's arguments with respect to claims 1-3, 5-13 and 15-21 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

13. Any inquiry concerning this communication from the examiner should be directed to Qamrun Nahar whose telephone number is (703) 305-7699. The examiner can normally be reached on Mondays through Thursdays from 9:00 AM to 6:30 PM. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki, can be reached on (703) 305-9662. The fax phone number for the organization where this application or processing is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

QN  
May 19, 2004

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